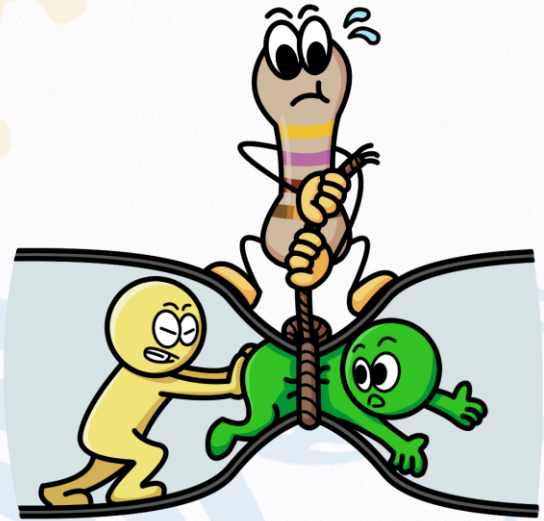
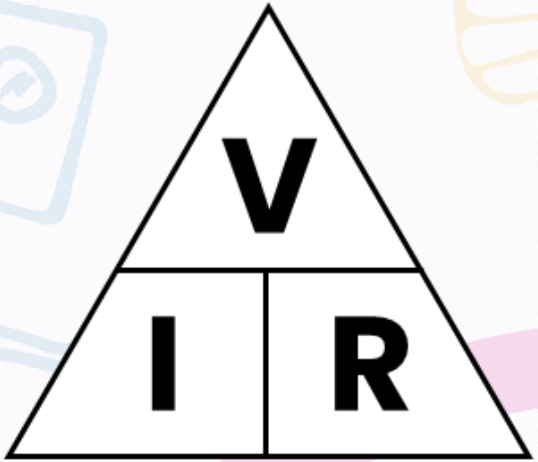
Ohm's Law

Voltage, Current, & Resistance





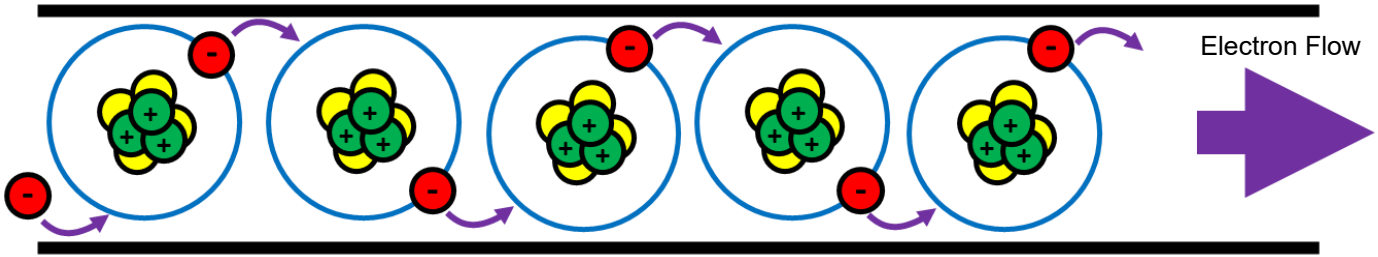
What is Voltage?

Voltage is a difference in electrical potential between two points.

It is measured in **volts** and named in honor of Italian physicist Alessandro Volta who invented batteries.

Alessandro Volta
1745-1827

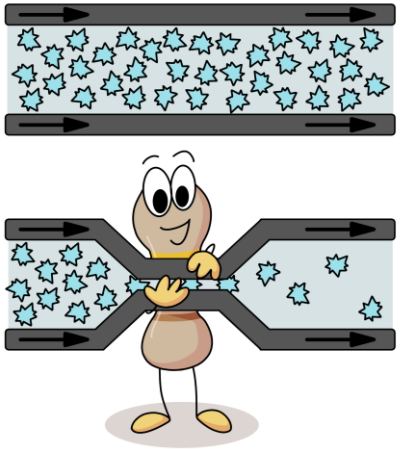
What is Current?



Current is the flow of electrons through an electrical conductor. Named after the French scientist **André-Marie Ampère** the measure of electrical current is the **ampere.**

André-Marie Ampère
1775-1836

What is Resistance?



Resistance is a measure of the opposition to current flow in an electric circuit. The measurement for electrical resistance, the **ohm**, named after German physicist Georg Ohm.

Greorg Simon Ohm
1789-1854

Ohm's Law

Formulated in the 1820s by Georg Ohm, Ohm's Law is a fundamental principle that describes the relationship between the electric properties current, voltage, and resistance.

Mathematically, Ohm's Law is expressed as:

$$V = I R$$

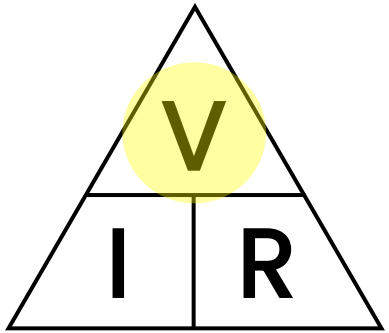
V = Voltage *measured in **volts** (V)*

I = Current *measured in **amperes** (A)*

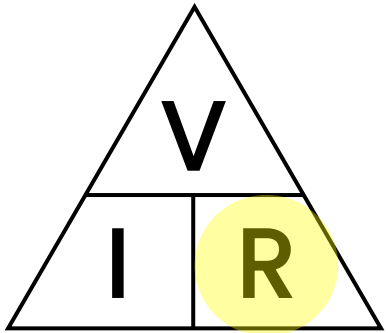
R = Resistance *measured in **ohms** (Ω)*

Using Ohm's Law to Calculate

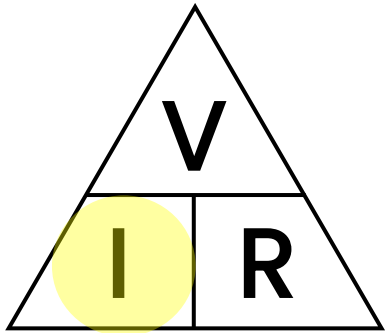
Ohm's Law can be used to mathematically calculate any one value when given any of the other two values. Below are the variations of the equation solving for voltage, resistance and current.



$V = IR$



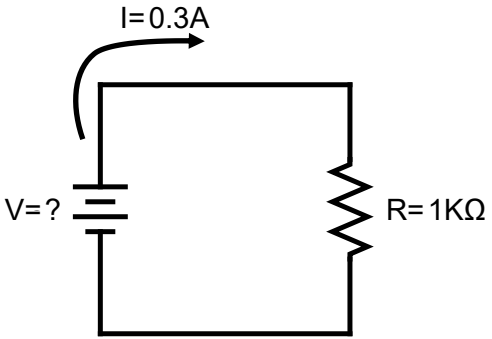
$R = \frac{V}{I}$



$I = \frac{V}{R}$

Ohm's Law : Calculate Voltage

In this circuit we can see the given current of (0.3A) and the given resistance of (1KΩ). Using the formula V=IR we can calculate the voltage in the circuit.



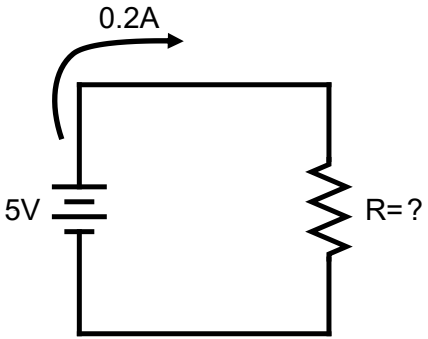
V = IR

V = 0.3 x 1000

V = 300V

Ohm's Law: Calculate Resistance

In this circuit we can see the given voltage (3V) and the given current (0.3A). Using the formula V=IR we can calculate the resistance in the circuit.



$V = IR$

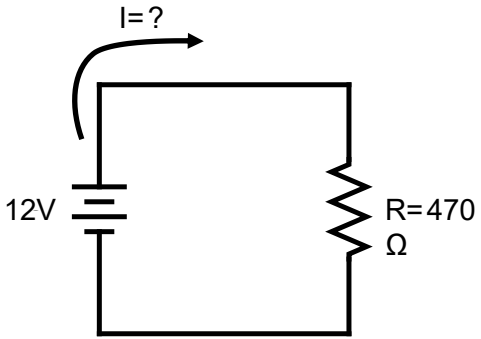
$5 = 0.2 \times R$

$R = \frac{5}{0.2}$

$R = 25\Omega$

Ohm's Law : Calculate Current

In this circuit we can see the given voltage (12V) and the given resistance of (470Ω). Using the formula V=IR we can calculate the current in the circuit.



$V = IR$

$12 = I \times 470$

$I = \frac{12}{470}$

$I \approx 0.026A$

$I \approx 26mA$

SQUARE BRAIN
Ohm's Law